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DATE: Monday, September 27, 2004

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	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ		
☐	L16	(intelligent adj2 network) near8 (multi-media or (multi adj media))	4
☐	L15	AIN near8 (media or multi-media or (multi adj media)) near8 (message or messaging)	1
☐	L14	L12 and l10	22
☐	L13	L12 and l8	39
☐	L12	(message or messaging) near8 (format or independent)	28069
☐	L11	L10 and (media near2 type)	1
☐	L10	L8 and announcement	31
☐	L9	L7 and ((media or multi-media or (multi adj media)) adj file)	0
☐	L8	L7 and media	52
☐	L7	L6 and (AIN adj2 message)	107
☐	L6	20001208	9175
☐	L5	((intelligent or intelligence) adj2 network) or AIN	170511
☐	L4	announcement adj2 (media or multi-media) adj2 file	0
☐	L3	L2 and (message or messaging)	14
☐	L2	20001208	19
☐	L1	(media near4 file near4 (identify or identification)) same (media near4 file near5 type)	44

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L16: Entry 1 of 4 File: PGPB Jun 13, 2002

DOCUMENT-IDENTIFIER: US 20020071529 A1
TITLE: Method and system for multimedia network based data acquisition, recording and distribution

CLAIMS:

19. A method for managing intelligent, network-based, multi-media recording and distribution services for distributed business organizations via a wide-area public switched telecom network or a wireless network, said method comprising: establishing telecom links with a plurality of service access nodes in the public telecom network for accessing subscriber calls, containing both voice and data; providing at least one access administration module for defining PRN parameters that identify communications to be acquired; providing at least one acquisition module for processing content and call information directed through a transfer data network to at least one recording center; establishing at least one recording administration module for defining and controlling recording, and all associated recording processing and storage policies, and retrieval/distribution services of said subscriber calls derived from the public network; and transferring retrieval/distribution data through a retrieval/distribution data network to at least one workstation for providing said retrieval/distribution service.

40. A system for managing intelligent, network-based, multi-media recording and playback services to distributed business organizations via a wide-area public telecom network, said system comprising: a plurality of service access nodes connected to telecom links in the public telecom network; at least one access administration module for defining PRN parameters that identify communications to be acquired; at least one acquisition management module for processing content and call information directed through a transfer data network to at least one recording center; at least one recording administration module for processing recording and playback information derived from said public network; and at least one playback workstation to receive playback data for playback service.

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L16: Entry 3 of 4 File: USPT Jul 8, 1997

DOCUMENT-IDENTIFIER: US 5646945 A
**** See image for Certificate of Correction ****
TITLE: Telecommunications system and telecommunications terminal equipment

Detailed Description Text (27):
The described configuration example contains all the essential features of the invention. Beyond that, numerous other configuration examples can be envisioned, which are perhaps targeted for highly integrated telecommunications terminals (e.g. multi-media terminals) or for complex telecommunications networks with IN functions (IN: intelligent network, such as UMTS: Universal Mobile Telecommunication System).

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L15: Entry 1 of 1 File: USPT Jul 9, 1996

DOCUMENT-IDENTIFIER: US 5535263 A
TITLE: Method for recording subscriber specific messages in an advanced intelligent network

CLAIMS:

18. The method of claim 17, further comprising:

generating a NCA.sub.-- Request message at said AIN SCP for receipt by said IP, said NCA.sub.-- Request message requesting the media type; and

generating a NCA.sub.13 Response message at said IP for receipt by said AIN SCP, said NCA.sub.13 Response message indicating the type of media selected.

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L11: Entry 1 of 1 File: USPT Jul 9, 1996

DOCUMENT-IDENTIFIER: US 5535263 A
TITLE: Method for recording subscriber specific messages in an advanced intelligent network

Abstract Text (1):
A method for recording subscriber specific messages in a telephone call for use in telephone services, particularly, for use in cooperation with an AIN Service Switching Point (SSP), an AIN Service Control Point (SCP) and an Intelligent Peripheral (IP). A CallInfoToResource message is generated at the AIN SCP for receipt by the SSP and the IP. The message instructs the SPP to establish a connection to the IP and further instructs the IP to record a subscriber message. The SSP generates a PRIFACILITY message which is directed for receipt by the IP and instructs the same to play an announcement and begin recording. Thereafter, an announcement is played at the IP which instructs the subscriber to begin speaking. The subscriber's message is recorded and a release message is generated at the SSP for receipt by the IP. The release message instructs the IP to tear down the call. A ResourceClear message is thereafter generated at the SSP for receipt by the SCP. The ResourceClear message indicates the status of the recording and an ID corresponding to the announcement to be used by the SCP in other services. A Disconnect message is thereafter generated at the SCP for receipt by the SSP. The Disconnect message instructs the SSP to tear down the call.

Application Filing Date (1):
19941013

Brief Summary Text (2):
The present invention relates generally to Advanced Intelligent Networks (AIN). More particularly, the invention relates to a method for recording subscriber specific messages in a telephone call for use in telephone services.

Brief Summary Text (4):
Telephone service providers presently have available numerous telephone services which may be offered to subscribers. Many of these services require greetings or other types of audible announcements to be recorded and played. As those skilled in the art will recognize, it is highly desirable to have these messages recorded in the voice of the telephone subscriber. However, the current state of available technology has heretofore prohibited such an approach.

Brief Summary Text (5):
As an example, consider an AIN "Do not Disturb" service which may be used to advise calling parties that the called party is presently unavailable and to try again later. While it would desirable to have this message provided in the voice of the called party, current technology requires such recordings to be physically "burned" into the Read Only Memory (ROM) of the corresponding central office switch of each subscriber. As readily seen, this is clearly an unmanageable task which becomes further complicated if the user desires to change his or her message or telephone at a later date.

Brief Summary Text (9):

It is a further object of the present invention to provide a method as above which is specifically directed for use in cooperation with an AIN Service Switching Point (SSP), the Service Switching Point connected to each of a subscriber, an AIN Service Control Point (SCP), and an Intelligent Peripheral (IP).

Brief Summary Text (11):
The method is directed for use in cooperation with an AIN Service Switching Point (SSP) which is connected to each of a subscriber, an AIN SCP, and an Intelligent Peripheral, as indicated above. The method comprises the steps of generating a "CallInfoToResource" message at the AIN SCP for receipt by the SSP and the IP. The CallInfoToResource message instructs the SSP to establish a connection to the IP and further instructs the IP to record a subscriber specific message.

Brief Summary Text (12):
The method further includes the generation of a PRIFACILITY message at the SSP for receipt by the IP. The PRIFACILITY message instructs the IP to play an announcement and begin recording. Thereafter, the announcement is played at the IP which instructs the subscriber to begin speaking. When the subscriber has completed his or her message, recording is stopped and a RELEASE message is generated at the SSP for receipt by the IP. The release message instructs the IP to tear down the call. Thereafter, a ResourceClear message is generated at the SSP for receipt by the SCP. The ResourceClear message indicates the status of the recording and an ID corresponding to the announcement to be used by the SCP and other services.

Brief Summary Text (14):
In one preferred embodiment of the invention, the AIN SCP is connected to the AIN SSP through Common Channel Signaling (CCS) and communicates with the SSP with AIN 0.0 or later TCAP messaging. The subscriber is further connected to the SSP with normal lines such as Basic Rate Interface (BRI), Plain Old Telephone Service (POTS), etc. The SSP is further connected to the IP with trunks such as Primary Rate Interface (PRI), T1, etc. or lines such as Basic Rate Interface (BRI), Plain Old Telephone Service (POTS), etc. In this preferred embodiment, the signaling between the SCP and the IP also takes place using an AIN 0.2 interface.

Brief Summary Text (16):
In yet another alternative embodiment, the method of the present invention may be operative with multiple media. In such a case, the incoming trunks/lines terminating at the IP may be mixed in use and the method further requires the generation of an NCA.sub.-- Request message at the AIN SCP for receipt by the IP. The NCA.sub.-- Request message requests the media type. Still further, an NCA.sub.13 Response message will be generated at the IP for receipt by the SCP. The NCA.sub.13 Response message indicates the type of media selected.

Drawing Description Text (3):
FIG. 1 is a schematic network diagram of the AIN infrastructure required for use with the present invention;

Drawing Description Text (5):
FIG. 3 is a schematic diagram of the message flows of the AIN service logic contained on the SCP in accordance with the present invention; and

Detailed Description Text (2):
Referring to FIG. 1, there is shown a network diagram of the Advanced Intelligent Network (AIN) infrastructure 10 required for use with the present invention. System 10 includes an AIN end office with AIN 0.0 or later software such as AIN Service Switching Point (SSP) 12. As those skilled in the art will recognize, in AIN architecture, Service Switching Points are generally nodes (usually the subscriber's local switch/central office switch) that recognize the "triggers" used when a subscriber invokes an Intelligent Network service and then communicates with a Service Control Point (SCP) to operate the service. AIN Service Control Points

are nodes which contain the service logic and associated data support to execute the required customer services. AIN Service Switching Points are typically connected to AIN Service Control Points via signaling links and packet switches such as AIN Service Transfer Points (STPs).

Detailed Description Text (3):
Referring still to FIG. 1 of the drawings, SSP 12 is connected with the Customer Premises Equipment (CPE) device 14 of the subscriber with normal lines such as Plain Old Telephone Service (POTS), Basic Rate Interface (BRI), etc. System 10 further includes an AIN Service Control Point (SCP) 16 which is connected to SSP 12 through Common Channel Signaling (CCS) such as CCS No. 7 (SS7) and is shown in one preferred embodiment of FIG. 1, connected through a Service Transfer Point (STP) 18.

Detailed Description Text (4):
Designed to be used primarily in high speed digital networks, Common Channel Signaling System No. 7 (SS7) is capable of controlling low speed analog facilities as well. SS7 generally operates at 64 KbPS and can support variable message links up to 2,176 bits (272 octets) of information per message. In keeping with the invention, SCP 16 communicates with Intelligent Peripheral (IP) 20 using either an AIN 0.2 IP interface or a direct data interface.

Detailed Description Text (5):
As those skilled in the art will further recognize, an AIN 0.2 IP interface is an interworking between Transaction Capability Application Part (TCAP) protocol and Integrated Services Digital Network (ISDN) Q.931 protocol, where the SCP 16 communicates to the IP 20 using TCAP, and the IP 20 communicates to the SSP 12 using Q.931. The SSP 12 interworks TCAP and Q.931.

Detailed Description Text (6):
In keeping with the invention, IP 20, which contains recording equipment for voice, fax, and other media, is connected with SSP 12 using trunks (TRI, T1, etc.) or lines (POTS, BRI). IP 20 can also be remotely located.

Detailed Description Text (7):
Alternatively, the signaling between SCP 16 and IP 20 may take place using a direct data interface. This is a direct connection, or connection through a data network, between the SCP 16 and the IP 20. As those skilled in the art will recognize, the higher layer protocol is very similar to that in the AIN 0.2 IP interface, except that Signaling System No. 7 (SS7) is not used. The underlying protocol would most likely be Ethernet, Fiber Distributed Data Interface (FDDI), Switched Multi-megabit Data Service (SMDS), etc.

Detailed Description Text (8):
The capability to record and use messages is controlled through service logic located in the AIN SCP 16. FIGS. 2-3 show the call flows between SSP 12, SCP 16, and IP 20 which are used to record voice for use in an announcement in accordance with the present invention. In these call flows, it is assumed for illustration purposes that an AIN 0.2 IP interface is being used for a local IP.

Detailed Description Text (9):
FIG. 2 provides a schematic diagram of the call flows resulting from a subscriber calling a specific "administration" telephone number. Subsequent to these call flows, the AIN service logic on the SCP is activated with the resulting call flows which are shown in FIG. 3. Referring to FIG. 2, the subscriber must first dial an administration number 22 that is used to record an announcement. This administration number on SSP 12 is provisioned with an AIN trigger. In the example shown, it is a termination attempt trigger 24. In keeping with the invention, however, it is recognized that other triggers could be used. Through the trigger, the SSP 12 detects that the administration number has been dialed and launches an

AIN query to the SCP 16. Thereafter, the AIN service logic on the SCP is invoked. Since the user is requesting to record an announcement, SCP 16 responds with a SendToResource message 26. SSP 12 will then send a PRI SETUP message 28 to the IP 20, instructing it, among other things, to play an announcement instructing the subscriber to enter his or her Personal Identification Number (PIN).

Detailed Description Text (11):
With reference now to FIG. 3 of the drawings, it is assumed that the PIN was entered correctly. The AIN service logic of the SCP to which the present invention is directed may thus be described.

Detailed Description Text (12):
As shown, the SCP 16 sends a CallInfoToResource message 38 to SSP 12. The CallInfoToResource message 38 instructs the SSP 12 to establish a connection to the IP 20, and for the IP 20 to record a message. The AIN CallInfoToResource message is modified. Specifically, the resource-type parameter is expanded to include the following:

Detailed Description Text (13):
1001 Play Announcement and Record Message

Detailed Description Text (14):
1002 Play Announcement, Record Message and Collect Digits

Detailed Description Text (43):
Thereafter, SSP 12 sends a PRIFACILITY message 40 to IP 20. This message instructs the IP 20 to play an announcement and begin recording, as defined above. The IP 20 thereafter plays an announcement 42 instructing the subscriber to begin speaking. The subscriber begins speaking 44 and, when finished, either lets the IP 20 time out or enters a digit, i.e. a Dual Tone Multi-Frequency (DTMF) digit to complete recording. Next, SSP 12 returns a RELEASE message 46 to the IP 20, instructing it to tear down the call. SSP 12 thereafter returns a ResourceClear message 48 to the SCP 16, indicating the status of the recording and the announcement ID to be used later in another service. It should be noted that in keeping with the invention, the CallInfoFromResource message may also be used if additional recordings are desired in the same session. This capability requires changes to the ResourceClear (and CallInfoFromResource) message as follows.

Detailed Description Text (47):
After performing the above steps, the SCP 14 would have an Announcement ID to be used in other services. Finally, SCP 16 returns a Disconnect message 50 to SSP 12, instructing it to tear down the call.

Detailed Description Text (48):
As referenced above, the present invention is also operable with respect to multiple media. In such a case, two preferred methods have been considered by applicant in which the IP 20 and SCP 16 may identify a specific media:

Detailed Description Text (49):
(1) Incoming trunks/lines terminating at the IP 20 can be dedicated to specific media. That is, certain trunk groups may be dedicated to voice messaging, while other trunk groups may be dedicated to FAX messaging, etc. In such case, the service logic on SCP 16 would determine the media type by its trunk identification (ID);

Detailed Description Text (50):
(2) Alternatively, incoming trunks/lines terminating at the IP 20 can be mixed in use. That is, a specific trunk/line can be used for voice and fax. "Off the shelf" equipment exists today that can handle both voice and fax. In such a case, the messaging between IP 20 and SCP 16 needs to identify a media type. Rather than

modify existing messages, this will be accomplished with "non-call associated signaling". That is, SCP 16 can send a message to IP 20 at any time, regardless of a call.

Detailed Description Text (51):
In order to do this, the EnvelopContent parameter of the NCA.sub.-- Request message will be defined (see GR-1129 Core Advanced Intelligent Network (AIN) Switch-Intelligent Peripheral Interface (IPI) generic requirements, Bellcore Issue 1, November 1993 for Non-call Associated signaling message definitions). In operation, SCP 16 would send an NCA.sub.-- Request message to the IP 20, requesting the media type. IP 20 would then respond with an NCA.sub.-- Response, indicating voice, FAX, etc. Specifically, the EnvelopContent for the NCA.sub.-- Request message will be encoded as follows:

Detailed Description Text (52):
First Octet Bit A-H: 1 for query media type message.

Detailed Description Text (54):
First Octet Bit A-H: media type (0 for voice, 1 for fax, 2 for video, etc.)

Detailed Description Text (60):
With reference to FIG. 4 of the drawings, the above method steps may be further summarized. As indicated, the method is directed for use in cooperation with an AIN Service Switching Point (SSP) which is connected to each of a subscriber, an AIN Service Control Point (SCP) and an Intelligent Peripheral (IP). The method includes generating 52 a CallInfoToResource message at the AIN SCP for receipt by the SSP and the IP. The CallInfoToResource message instructs the SSP to establish a connection to the IP and further instructs the IP to record a subscriber message. Thereafter, a PRIFACILITY message is generated 54 at the SSP for receipt by the IP. The PRIFACILITY message instructs the IP to play an announcement and begin recording.

Detailed Description Text (61):
An announcement is thereafter played 56 at the IP instructing the subscriber to begin speaking. Following recordal 58 of the subscriber's message, a RELEASE message is generated 60 at the SSP for receipt by the IP. The RELEASE message instructs the IP to tear down the call. Thereafter, a ResourceClear message is generated 62 at the SSP for receipt by the SCP. The ResourceClear message indicates the status of the recording and an ID corresponding to the announcement to be used by the SCP in other services. Finally, a DISCONNECT message is generated 64 at the SCP for receipt by the SSP. The disconnect message instructs the SSP to tear down the call.

Other Reference Publication (1):
"The Intelligent Network Concept", Jean S. Doyle et al., IEEE Transactions on Communications, vol. 36, No. 12, Dec. 1988, pp. 1296-1301.

CLAIMS:

1. For use in cooperation with an Advanced Intelligent Network (AIN) Service Switching Point (SSP), said SSP connected to each of a subscriber, an AIN Service Control Point (SCP) and an Intelligent Peripheral (IP), a method for recording a subscriber specific message in a telephone call for use in telephone services, comprising:

generating a CallInfoToResource message at said SCP for receipt by said SSP and said IP, said CallInfoToResource message instructing said SSP to establish a connection to said IP and further instructing said IP to record a subscriber message;

generating a PRIFACILITY message at said SSP for receipt by said IP, said PRIFACILITY message instructing said IP to play an announcement and begin recording;

playing an announcement at said IP instructing said subscriber to begin speaking;

recording said subscriber's message;

generating a RELEASE message at said SSP for receipt by said IP, said release message instructing said IP to tear down the call;

generating a ResourceClear message at said SSP for receipt by said SCP, said ResourceClear message indicating the status of the recording and an identification corresponding to said announcement to be used by said SCP in other services; and

generating a Disconnect message at said SCP for receipt by said SSP, said Disconnect message instructing said SSP to tear down the call.

2. The method of claim 1, wherein said AIN SCP is connected to said AIN SSP through Common Channel Signaling (CCS) and communicates with said SSP with AIN 0.0 or later Transaction Capability Application Part (TCAP) messaging.

3. The method of claim 1, wherein said subscriber is connected to said AIN SSP with lines.

4. The method of claim 1, wherein said subscriber is connected to said AIN SSP with Basic Rate Interface (BRI) lines.

5. The method of claim 1, wherein said subscriber is connected to said AIN SSP with Plain Old Telephone Service (POTS) lines.

6. The method of claim 1, wherein said AIN SSP is connected to said IP with trunks.

7. The method of claim 1, wherein said AIN SSP is connected to said IP with Primary Rate Interface (PRI) trunks.

8. The method of claim 1, wherein said AIN SSP is connected to said IP with T1 trunks.

9. The method of claim 1, wherein said AIN SSP is connected to said IP with lines.

10. The method of claim 1, wherein said AIN SSP is connected to said IP with Plain Old Telephone Service (POTS) lines.

11. The method of claim 1, wherein said AIN SSP is connected to said IP with Basic Rate Interface (BRI) lines.

12. The method of claim 1, wherein the signaling between said AIN SCP and said IP takes place using an AIN 0.2 interface.

13. The method of claim 1, wherein the signaling between said AIN SCP and said IP takes place using a direct data interface.

15. The method of claim 1, wherein said AIN SCP and said IP are operative with multiple media.

16. The method of claim 1 wherein said AIN SCP includes service logic operative to determine media type by trunk identification.

17. The method of claim 15, wherein said AIN SSP is connected to said IP with trunks and lines.

18. The method of claim 17, further comprising:

generating a NCA.sub.-- Request message at said AIN SCP for receipt by said IP, said NCA.sub.-- Request message requesting the media type; and

generating a NCA.sub.13 Response message at said IP for receipt by said AIN SCP, said NCA.sub.13 Response message indicating the type of media selected.

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L14: Entry 1 of 22 File: PGPB Oct 3, 2002

DOCUMENT-IDENTIFIER: US 20020141381 A1
TITLE: Session initiation protocol based advanced intelligent network/intelligent network messaging

Abstract Paragraph:
A method and system enables distributed transaction oriented telephony functionality for telephony services in a broadband packet network. Exemplary distributed transaction oriented telephony functionality includes Intelligent Network (IN) and Advanced Intelligent Network (AIN) functionality accessed through the legacy Common Channel Signaling (CCS) network using transaction-based messaging protocols, such as Intelligent Network Application Part (INAP) and/or Transaction Capability Application Part (TCAP) protocols. A functional content of a transaction message, such as a TCAP message, is encapsulated in a Protocol Data Unit (PDU) of the broadband packet network. The PDU is forwarded through the broadband packet network to a second network element. The functionality is then invoked using the encapsulated transaction message functional content. In preferred embodiments the PDU is a Session Initiation Protocol (SIP) envelope, into which TCAP message functional content can be mapped.

Application Filing Date:
20001130

Summary of Invention Paragraph:
[0003] The present invention relates to intelligent network/advanced intelligent network (IN/AIN) services, and, in particular, to a method of enabling IN/AIN functionality for telephony services deployed in a broadband packet network.

Summary of Invention Paragraph:
[0004] Modern telephony services deployed in the Public Switched Telephone Network (PSTN) commonly rely on distributed transaction oriented telephony functionality, such as, for example Intelligent Network and/or Advanced Intelligent Network (IN/AIN) functionality in order to deliver sophisticated call control services to subscribers. Typically, this distributed functionality involves various network elements (e.g. Service Control Points (SCP's), Intelligent Peripherals (IPe's) and Interactive Voice Response (IVR) servers) and transaction-based protocols (such as Intelligent Network Application Part (INAP), and Transaction Capability-Application Part (TCAP)) deployed in the Common Channel Signaling (CCS) network. INAP and TCAP operate over conventional Signaling System 7 (SS7) infrastructure, and supplements legacy Integrated Services Digital Network-User Part (ISUP) signaling by providing a query/response protocol for accessing routing information and telephony services provided by IN/AIN capable network elements within the CCS network.

Summary of Invention Paragraph:
[0007] In order to address issues of scalability within the PSTN, various efforts have been made to deploy telephony services in a broadband packet network such as an internet protocol (IP) network. Various protocols have been proposed to enable this functionality, including various Voice over IP (VoIP) protocols for carrying bearer traffic, as well as session set-up and routing protocols (such as Multi-protocol Label Switched Path (MPLS) and Session Initiation Protocol (SIP)) for

establishing communications sessions and for routing the bearer traffic through the network. In general, it is also possible to deploy resources in a broadband packet network that enable services similar to those provided by the legacy CCS network. However, in order to establish telephone connections between points in the PSTN and a packet network, interaction between resources of the broadband packet and CCS networks is essential. One method of accomplishing this has been proposed by V. Gurbani in an Internet Engineering Task Force (IETF) draft entitled "Accessing IN services from SIP networks". FIG. 1 is a block diagram illustrating the system of Gurbani for enabling IN/AIN functionality for telephony services deployed in a SIP network 2. As shown in FIG. 1, Gurbani teaches an IN state machine 4 overplayed on the conventional SIP state machine 6 within a SIP server 8 of the SIP network 2. The IN state machine 4 operates to generate conventional TCAP messages reflecting the state of the SIP state machine 6, and forwards these messages though the legacy CCS network 10 to an IN/AIN capable device 12 (e.g. an SCP and/or an IPe). TCAP messages (e.g. response messages) are received over the CCS network 10 by the IN state machine 4 and passed to the SIP state machine 6 to control call setup through the SIP network 2.

Summary of Invention Paragraph:
[0008] Thus, in the system of Gurbani, the IN state machine 4 operates as an interface between the SIP network 2 and the conventional CCS network 10, which enables a SIP server 8 to emulate a Service Switch Point (SSP) of the PSTN for the purposes of accessing IN/AIN functionality. However, this system suffers from the limitation that it increases the amount of TCAP traffic in the CCS network 10, and thus increases the risk of signaling port exhaustion in the CCS network element 12. This risk increases as the amount of telephony traffic in the SIP network 2 increases.

Summary of Invention Paragraph:
[0014] The broadband packet network comprises any one or more of: an Asynchronous Transfer Mode (ATM) network; an internet Protocol (IP) network; a Frame Relay (FR) network; and an Integrated Services Digital Network (ISDN). In preferred embodiments of the invention, the broadband packet network comprises an IP Network, and the PDU comprises a Session Initiation Protocol (SIP) message envelope. In such cases, the functional content of an IN/AIN message may be inserted into a Multipurpose Internet Mail Extension (MIME) part of the SIP envelope.

Summary of Invention Paragraph:
[0015] Each network element may comprise a media gateway controller adapted to enable telephony signal traffic through the broadband packet network, or an application server adapted to invoke IN/AIN functionality using IN/AIN functional content. An application server may be either: a CCS network element adapted to send and receive PDU's of the broadband packet network; or a network element of the broadband packet network.

Summary of Invention Paragraph:
[0017] Alternatively, encapsulation of the functional content of the transaction message may comprise mapping a transaction message onto the PDU. In some embodiments, the transaction message is a Transaction Capability-Application part (TCAP) message. In such cases, a TCAP message type is mapped onto a respective message type of the PDU. The TCAP message type may comprise any of: query; response; conversation; unidirectional and abort. In other embodiments, the transaction message is an Intelligent Network-Application part (INAP) message. In such cases, an INAP message type is mapped onto a respective message type of the PDU. The INAP message type may comprise any of: begin; end; continue; unidirectional and abort.

Summary of Invention Paragraph:
[0020] An advantage of the present invention is that conventional TCAP message functional content can be transported across the broadband packet network to an

Application Server to invoke IN/AIN functionality, without utilizing legacy CCS network infrastructure. Consequently, IN/AIN functionality can be invoked in respect of telephony services deployed in the broadband packet network, without contributing to signaling port exhaustion in the CCS network.

Brief Description of Drawings Paragraph:
[0022] FIG. 1 is a block diagram schematically illustrating operations of a prior art system for accessing IN/AIN functionality for telephony services in a broadband packet network;

Brief Description of Drawings Paragraph:
[0023] FIG. 2 is a block diagram schematically illustrating operations of a system for accessing IN/AIN functionality for telephony services in a broadband packet network, in accordance with an embodiment of the present invention;

Brief Description of Drawings Paragraph:
[0026] FIG. 4a is a message flow diagram showing principle messages exchanged in an AIN send-to-resource transaction in accordance with the prior art;

Brief Description of Drawings Paragraph:
[0027] FIG. 4b is a message flow diagram showing principle messages exchanged in the AIN send-to-resource transaction of FIG. 4a utilizing TCAP encapsulated within SIP in accordance with an embodiment of the present invention;

Detail Description Paragraph:
[0032] The present invention provides a method and apparatus for enabling Intelligent Network/Advanced Intelligent Network (IN/AIN) functionality for telephony services deployed in a broadband packet network. FIG. 2 is a block diagram illustrating exemplary elements of a network 14 in which the present invention may be deployed.

Detail Description Paragraph:
[0033] As shown in FIG. 2, telephony services can be deployed within a broadband packet network 14 in a generally conventional manner. The broadband packet network 14 can be formed of one or more federated packet networks (e.g. Internet Protocol (IP), asynchronous transfer mode (ATM), frame relay (FR) and Integrated Services Digital network (ISDN)) with appropriate format adaptation at network boundaries. Communications sessions can be set up across the broadband packet network 14, e.g. between media gateway controllers (MGCs) 16a, 16b using any known session control protocol, such as, for example, Session Initiation Protocol (SIP), which may encapsulate legacy Integrated Services Digital Network-User Part (ISUP) messages to enable connections to be set up across the Public Switched Telephone Network (PSTN) (not shown). IN/AIN functionality is provided by an application server (AS) 18, which may be provided as one or more legacy elements of the CCS network, such as, for example, Service Control Points (SCP's), Intelligent Peripherals (IPe's), and Interactive Voice Response (IVR) servers suitably adapted to enable signaling through the broadband packet network. Alternatively, the AS 18 may be provided as a server deployed in the broadband packet network 14. In the embodiment illustrated in FIG. 2, a single AS 18 is provided for invoking IN/AIN functionality. It will be understood that IN/AIN functionality will normally be provided by two or more devices, working alone or in combination. For ease of description of the present invention, a simplified network topology is presented, in which the IN/AIN functionality is enabled by interaction between a single MGC 16a of the broadband packet network and a single AS 18. It will be recognized, however, that the present invention is not limited to this simplified embodiment.

Detail Description Paragraph:
[0034] The present invention operates to enable Intelligent Network Application Part (INAP) and/or Transaction Capability-Application Part (TCAP) query/response transactions between MGCs 16 and application servers 18, bypassing the CCS network

infrastructure for message transport. This operation enables IN/AIN functionality for telephony services deployed in the broadband packet network 14, without increasing the risk of port exhaustion in CCS network elements Thus in accordance with the present invention, at least the functional content of each INAP and/or TCAP message is encapsulated within a PDU of the broadband packet network, which is then used for message transport. In embodiments in which the AS 18 is provided by legacy CCS network elements (e.g. SCP's and IPe's), a logical connection between the broadband packet network 14 and the AS 18, in order to facilitate transport of TCAP-encapsulating PDU's, can be established using existing IP, FR or ISDN ports of the AS 18, which are commonly used for network management traffic. Alternatively, the AS 18 can be provisioned with new IP ports, in addition to and/or in place of existing SS7 ports. By virtue of the flexibility and scalability afforded by IP, it is typically easier and less expensive to add IP ports to an existing SCP, IVR, or IPe than it is to add equivalent SS7 ports.

Detail Description Paragraph:
[0043] FIG. 4a shows principle steps of a "send to resource" conversation according to the prior art. As shown in FIG. 4a, an SSP forwards a TCAP-Query with Permission (QwP) to an SCP (at step S12), which responds by returning a TCAP-Response (send to resource) to the SSP (step S14). Based on the content of the TCAP-Response message, the SSP sets up a connection to an Intelligent Peripheral (IPe) (step S16), which can then perform various functions, such as playing an announcement (step S18), and/or collecting dialed digits (step S20). The IPe then forwards a Facility message (step S22) containing the results of its processing (e.g. dialed digits) to the SSP, which in turn forwards this data to the SCP in a TCAP-CwP (Call Information From Resource (CIFR)) message to the SCP (step S24). The SCP returns a TCAP-CwP (Call Information To Resource (CITR)) message to the SSP (step S26), which in turn forwards a Facility message containing the CITR information to the Intelligent Peripheral (step S28). The Intelligent Peripheral then sends a Release message to the SSP (step S30) to release the connection between the SSP and the IPe. Upon receipt of the Release message, the SSP sends a TCAP-CwP message indicating that the resource is clear to the SCP (step S32), which returns a TCAP-Response message to the SSP (step S34). As described above, the messages exchanged between the SCP and the SSP are TCAP messages. Conversely, messages exchanged between the SSP and the intelligent peripheral would normally be Private Rate Interface (PRI) protocol messages, conveyed over an Integrated Services Digital Network (ISDN) or ethernet link.

Detail Description Paragraph:
[0044] FIG. 4b illustrates the equivalent "send to resource" transaction using SIP encapsulating TCAP in accordance with the present invention. As shown in FIG. 4b, an MGC 16 forwards a SIP-Invite message encapsulating the content of the TCAP-QwP message to the AS 18 (at step S36), which responds by returning first a SIP-Ack (step S38) and then a SIP-182 Queued message encapsulating the content of a TCAP "send to resource" message to the MGC 16 (step S40). Based on the content of the SIP-182 Queued message, the MGC 16 sets up a connection to an Intelligent Peripheral (Ipe) (step S42), which then performs various functions, such as playing an announcement (step S44) and/or collecting dialed digits (step S46). The Intelligent Peripheral then forwards a Facility message containing the results of its processing (e.g. dialed digits) to the MGC 16 (step S48), which in turn forwards this data to the AS 18 in a SIP-182 Queued message (step S50). The AS 18 returns a SIP-182 Queued message containing Circuit Information To Resource (CITR) information to the MGC 16 (step S52), which in turn forwards a Facility message containing the CITR information to the Intelligent Peripheral (step S54). The Intelligent Peripheral then sends a Release message to the MGC 16 (step S56) to release the connection between the MGC 16 and the IPe. Upon receipt of the Release message, the MGC 16 sends a SIP-182 Queued message indicating that the resource is clear to the AS 18 (step S58), which returns a SIP-200 OK message to the MGC 16 (step S60). As described above in respect of FIG. 4a, the signals between the MGC 16 and the intelligent peripheral would normally be in Private Rate Interface (PRI)

messages, and may be conveyed over an Integrated Services Digital Network (ISDN) or ethernet link.

Detail Description Paragraph:
[0073] As is known in the art, MIME was originally designed to attach files to email messages, but can be readily adapted for use in other transport systems. For the purposes of the present invention, the MIME part 24 is used to attach the TCAP binary message part 28 to the end of the SIP/SDP combination. MIME multipart payloads enable a SIP envelope 20 to carry any PSTN/CCS signaling information required to invoke IN/AIN functionality. The multipart body can consist of any combination of: SDP payload; TCAP payload; and/or any number of MIME types.

Detail Description Paragraph:
[0084] The SIP message format requires the first line to be a `Request` line, followed by a series of `Header` lines, a <CRLF> separator, and, lastly, the message body. In the present example, the SDP Part 26 and MIME payload 28 are separated by a boundary parameter which, for this example, has the value of "unique-boundary-1".

Detail Description Table CWU:
4TABLE 4 Field Description Example values v Version: protocol version number o Origin: owner or o=<username><session creator and session id><version> <network identifier type><address type><address> The value of this <username> is preferably the field must uniquely Calling Party from the SCCP identify the session global title. s Session Name: A text description m Media Description: m=<media> <port> <transport> Name and Transport <fmt list> address <media> may be any of "audio", "video", "application", "data" or "control" c Connection Data `IN` (Internet) followed by the `1P4` (identifying the This is an optional IP version 4 method of IP field address ID) followed by the connection IP address. Other variations exist, including TTL information for multicast addresses. e, p Email Address and This field may be used to Phone Number reflect the Calling Party e=<email address> address from the SCCP global p=<phone number> title address. These fields specify contact information of the person responsible for the Conference. This may not Be the initiator of the session. These are an optional field

CLAIMS:

2. A method as claimed in claim 1, wherein the distributed transaction oriented telephony functionality comprises intelligent network/advanced intelligent network (IN/AIN) functionality.

5. A method as claimed in claim 1, wherein the first network element comprises a media gateway controller adapted to enable telephony signal traffic through the broadband packet network.

9. A method as claimed in claim 8, wherein the transaction message comprises either one of a Transaction Capabilities Application Part (TCAP) message and an Intelligent Network Application Part (INAP) message.

14. A method as claimed in claim 10, wherein the transaction message comprises an Intelligent Network-Application Part (INAP) message.

26. A system as claimed in claim 25, wherein the distributed transaction oriented telephony functionality comprises intelligent network/advanced intelligent network (IN/AIN) functionality.

29. A system as claimed in claim 25, wherein the first network element comprises a media gateway controller adapted to enable telephony signal traffic through the broadband packet network.

33. A method as claimed in claim 32, wherein the transaction message comprises either one of a Transaction Capabilities Application Part (TCAP) message and an Intelligent Network Application Part (INAP) message.

38. A system as claimed in claim 34, wherein the transaction message comprises an Intelligent Network-Application Part (INAP) message.

50. A node as claimed in claim 49, wherein the distributed transaction oriented telephony functionality comprises intelligent network/advanced intelligent network (IN/AIN) functionality.

53. A node as claimed in claim 49, wherein the node comprises either one of: a) a media gateway controller adapted to enable telephony signal traffic through the broadband packet network; and b) an application server adapted to invoke IN/AIN functionality using TCAP functional content.

56. A node as claimed in claim 55, wherein the transaction message comprises either one of a Transaction Capabilities Application Part (TCAP) message and an Intelligent Network Application Part (INAP) message.

61. A node as claimed in claim 57, wherein the transaction message is an Intelligent Network Application Part (INAP) message.

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